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ABSTRACT

This student manual, the sixth in a set of 14 modules, is designed to train emergency medical technicians (EMTs) in Ohio. The module contains three sections covering the following course content: control of bleeding, caring for wounds and bandaging various body parts, and caring for shock victims. Each section contains objectives, an introduction, and information text. The text is illustrated with line drawings and photographs. (KC)

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EMERGENCY VICTIM CARE

ED239059

Module 6

—Bleeding Control
—Wounds and Bandaging
—Shock

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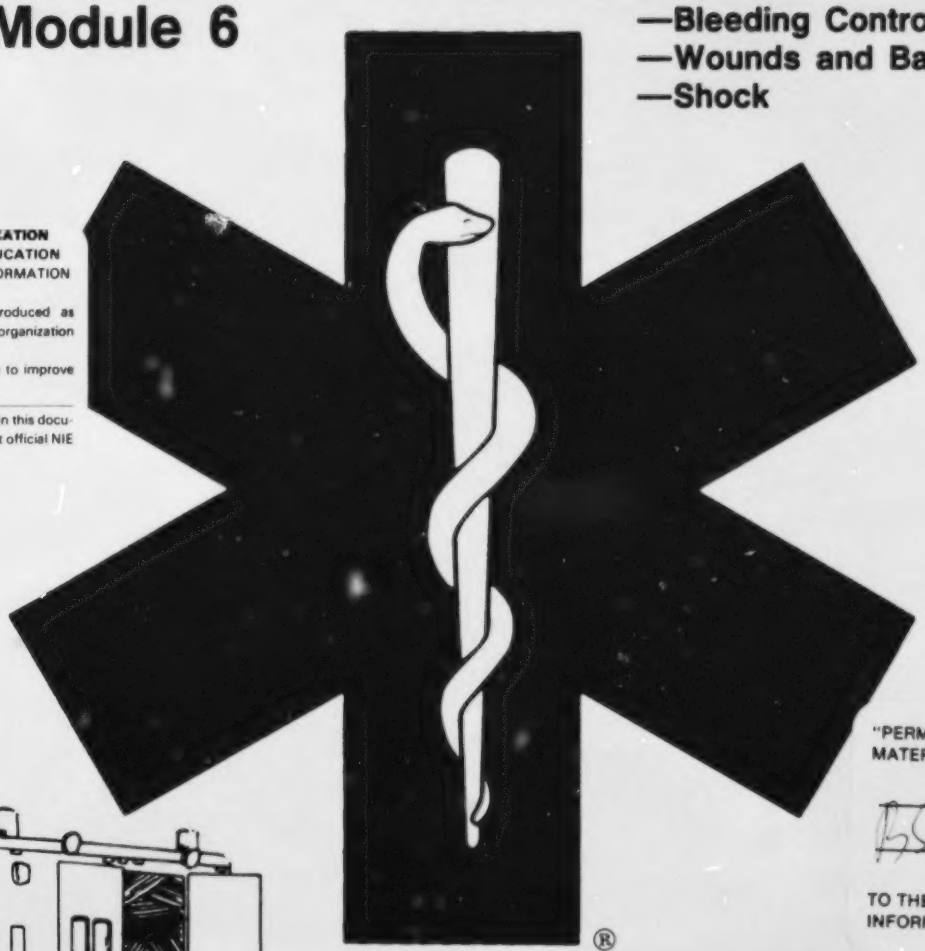

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EMERGENCY VICTIM CARE

A TRAINING MANUAL FOR EMERGENCY MEDICAL TECHNICIANS

OHIO TRADE AND INDUSTRIAL EDUCATION SERVICE

DIVISION OF VOCATIONAL EDUCATION
STATE DEPARTMENT OF EDUCATION
COLUMBUS, OHIO

TO THE LEARNER

The 1983 Emergency Victim Care textbook revision has been grouped into 14 modules. The modules have been grouped by content matter as follows:

Module 1

Preface
Foreword
Acknowledgment
Student-Instructor Relationship

Personnel
Emergency Medical Service Vehicles
EMS Communication
Records and Reports

Module 2

Equipment
Safe Driving Practices
Legal Aspects
Controlling the Situation
Action Evaluation Conference

Module 3

Anatomy & Physiology

Module 4

Vital Signs
Patient Assessment

Module 5

Cardiopulmonary Resuscitation (CPR)

Module 6

Bleeding Control
Wounds and Bandaging
Shock

Module 7

Medical Emergencies

Module 8

Crisis Intervention
Drug-Related Problems

Module 9

Backboards/Moving and Handling the Victim
Fractures
Dislocations

Module 10

Injuries of the Eye, Ear, Nose, Abdomen, C.N.S. and Genitalia
Burns and Environmental Injuries

Module 11

Childbirth
Pediatric Emergency

Module 12

Water Accidents
Electrical Emergencies
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Extrication from Automobiles

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MODULE 6

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CHAPTER XIV

BLEEDING CONTROL

OBJECTIVES

Upon completion of the following chapter, you will be able to:
—recognize the importance of immediate control for all types of bleeding.
—recognize symptoms of internal bleeding.
—describe procedures for effective bleeding control.

Following instruction and/or practice, you will be able to:
—examine a victim for internal bleeding.
—demonstrate methods for effective bleeding control.

INTRODUCTION

Bleeding is one of the most dramatic emergencies necessitating prompt care. It is imperative the EMT act promptly and efficiently. Loss of blood is a dangerous condition that can quickly cause death. Absence of breathing is the only condition that would take priority over bleeding control. However, absence of breathing and serious bleeding are both of such great importance that, whenever possible, one EMT should take care of one condition while another EMT attends at once to the other.

DEFINITION

Bleeding, or hemorrhage, is the escape of blood from arteries, veins, and capillaries through a break in their walls. Discharge of blood from the vessels, either external or internal, must be considered abnormal.

FACTS CONCERNING BLOOD AND BLEEDING

One-twelfth to one-fifteenth of body weight is blood. This would amount to 10 to 12 pints in an individual weighing 150 pounds. The loss of one pint of blood usually produces no harmful effects; the loss of approximately three pints will cause shock. The cutting of the major blood vessels of the neck, arm, or thigh can cause bleeding so severe that death results between one to three minutes. Rupture of the main trunk artery or vein may result in fatal bleeding within 30 seconds.

Severe or uncontrollable bleeding from a wound or injury that usually would not warrant such hemorrhage should alert the EMT to suspect the victim may be a "bleeder" (hemophiliac).

Hemophilia or "bleeder's disease" is the result of the victim's blood failing to clot due to a deficiency or chemical change within the clotting mechanism. This is a hereditary condition transmitted from the female to her male children. Females seldom suffer from this disease. Most victims of this disease carry a medic-alert emblem.

This condition may also be brought about by the use of some medications used to thin the blood. This condition is sometimes called drug hemophilia.

BLEEDING CLASSIFICATION IN REFERENCE TO TIME

Primary Bleeding—Occurs at the time of injury.

Consecutive Bleeding—Occurs some time after an injury or in the case of surgery, 12 to 48 hours after the operation.

Secondary Bleeding—This is a hemorrhage that occurs after a 48-hour period, up to the time of complete healing.

BLEEDING CLASSIFICATION IN REFERENCE TO SOURCE

Arterial Bleeding—Is bright red in color and appears in spurts with each heartbeat, unless the torn or severed artery is deep. Arterial bleeding is very rapid and the most difficult to control.

Venous Bleeding—Is dark red in color and presents itself in a steady flow under low pressure. Though not as dramatic as arterial bleeding, its steady flow can be equally dangerous if unchecked. Venous bleeding is almost always controllable by applying a snug pressure dressing. Elevation of the bleeding part will assist in stopping the more profuse bleeding.

Capillary Bleeding—Has an intermediate color and oozes from the minute vessels of the wound. Capillary bleeding is easily controlled using a sterile compress applied with bandages.

SYMPTOMS OF BLEEDING

External bleeding can be seen and is easily recognized. Internal or concealed bleeding is difficult to determine and identify. Concealed bleeding is usually the result of heavy blows or crushing injuries that damage the internal organs. Victims of some minor automobile accidents may suffer serious internal bleeding due to their being thrown against the steering wheel.

Whether bleeding is external or internal, the symptoms will be the same; and their degree will depend on the amount and speed of blood loss.

Any number of the following signs/ symptoms may be present.

1. The skin will be pale, moist and clammy.
2. Body temperature is below normal.
3. Pulse is fast, weak, and may be regular or irregular.
4. Pupils of eyes will dilate and reaction to light will be slow.
5. Ringing in ears (tinnitus).
6. Faintness or actual fainting (may be the first symptom of internal hemorrhage).
7. Complains of thirst (dehydration).
8. Breathing is fast, shallow, and gasping (air hunger).
9. Apprehension and restlessness.
10. Loss of consciousness with stoppage of breathing.
11. Shock will always be present to some degree.
12. Low blood pressure (systolic under 90mm).

EMERGENCY CARE

EXTERNAL BLEEDING

Prompt and decisive measures must be taken in all emergencies involving hemorrhaging. There are five methods of bleeding control: (1) direct pressure, (2) elevation, (3) cold applications, (4) digital pressure, and (5) the tourniquet.

Direct Pressure—This is the method of choice in over 90 percent of all bleeding. Regardless of the bleeding source, pressure is applied directly to the wound with a sterile compress and held in place with a snug bandage (pressure dressing). See Figure 1.

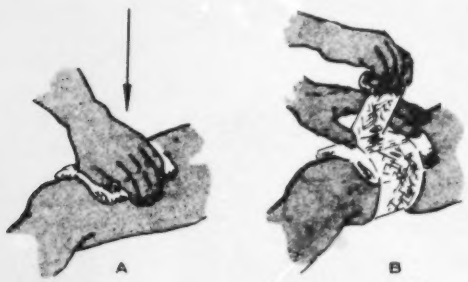


Figure 1. Direct pressure to control bleeding. A—Direct hand pressure over bleeding point to control hemorrhage; B—Application of snug bandage to maintain pressure.

Elevation—In wounds or injuries to an extremity, apply a pressure dressing and elevate the part. The force of gravity retards the flow of blood, and continued elevation will stop the bleeding.

Cold Applications—The use of cold compresses or cold packs for nosebleeds and other suspected internal bleeding will slow or stop capillary bleeding and some venous bleeding. In contusions, cold applications will prevent discoloration.

Prolonged use of cold packs is to be avoided, for it will retard circulation and may lead to tissue damage.

Digital Pressure—Pressure on the pressure points will control arterial bleeding to the area supplied by that artery. There are occasions when the bleeding part is in an area not accessible for direct pressure. In this case, the bleeding should be controlled by a pressure point until the part is freed and bleeding can be controlled by a pressure dressing. Figure 2 should be carefully studied, and the points where arteries can be compressed against bony surfaces should be memorized.

The Tourniquet—Application of a tourniquet has been the topic of many discussions leading to a certain degree of controversy. The best advice may be to never use the tourniquet, yet there are those isolated cases of complete limb destruction or amputation with severe bleeding that can only be controlled with this method.

The use of a tourniquet can only be considered when all other methods of bleeding control fail. When the decision is made to use it, always place it between the wound and the heart and as close to the wound as possible. Once applied it must not be removed until the victim is within a medical facility and a physician is in attendance.

A tourniquet is a constricting band which can be placed around an extremity and tightened until all arterial blood flow stops. Tourniquets may be made from rubber tubing, a webbed strap or a cravat; or any one of many commercial types on the market can be used. In emergency care it is recommended that only an improvised tourniquet be used. It is made by preparing a cravat bandage as shown in Figure 3.

The tourniquet should be tight enough to stop the bleeding. If it is too tight it may damage muscles, nerves, and blood vessels. The limb below the tourniquet should appear pale. The pulse in the limb beyond the tourniquet must disappear. If the tourniquet is not tight enough, it will compress the veins and yet not stop the arterial flow. The limb then continues to be filled with blood and it cannot escape or return through the veins. As a result, it will bleed more rapidly through the wound. If the tourniquet is too narrow, it will damage the limb.

Tourniquets have been applied and forgotten and the extremity covered with bandages. To avoid such a situation, the victim should be tagged or marked to indicate the location of the tourniquet and the time it was applied.

INTERNAL BLEEDING

Internal bleeding includes many different kinds of blood loss. The usual reference is to injuries or ailments where there is an escape of blood into the tissues or into the body cavities. Internal bleeding occurs frequently as a result of injuries received in auto accidents, falls, kicks, explosions and other physical or mechanical forces.

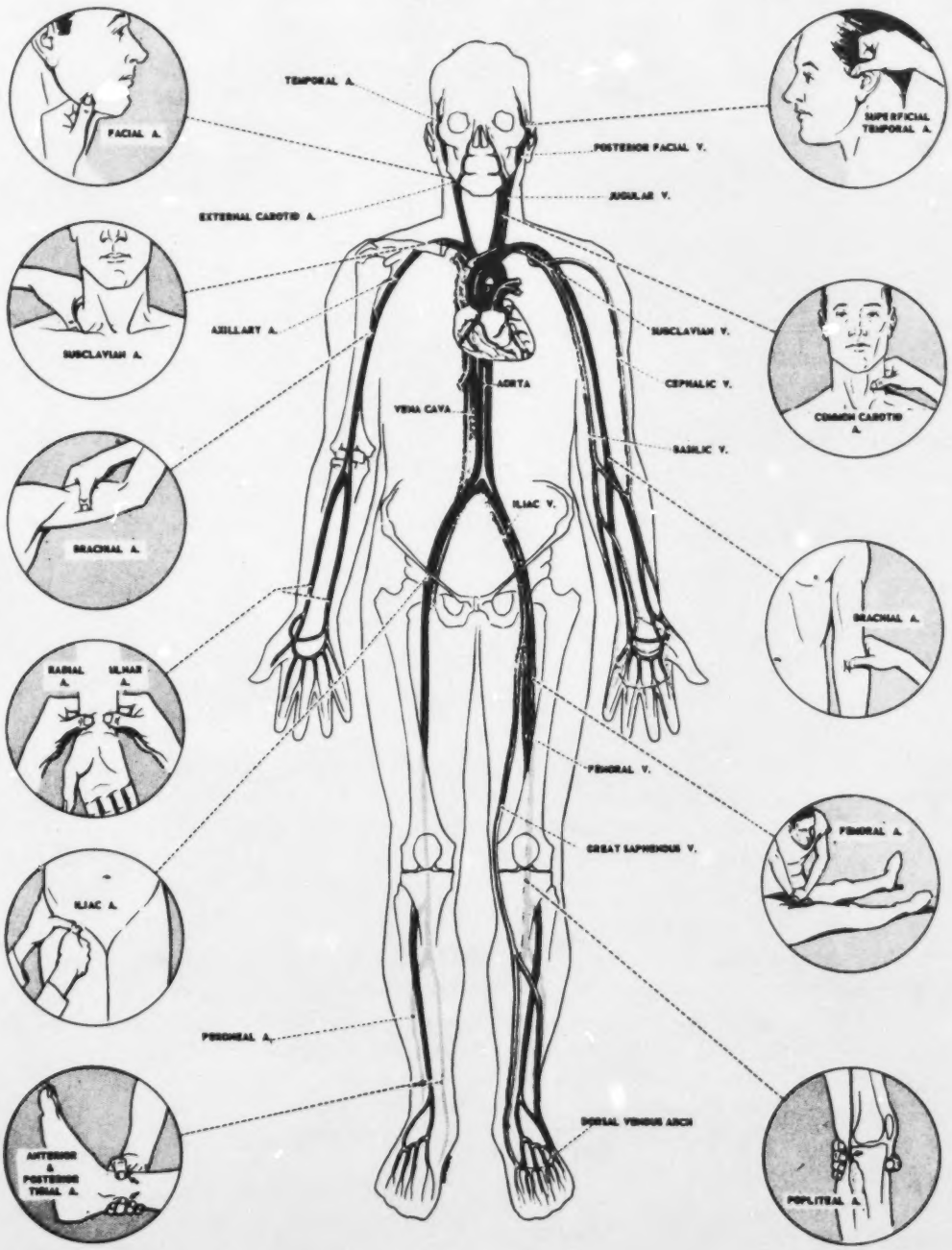


Figure 2. Pressure Points — At the indicated points, arteries are close to the surface and/or they can be compressed against an adjacent bone surface.

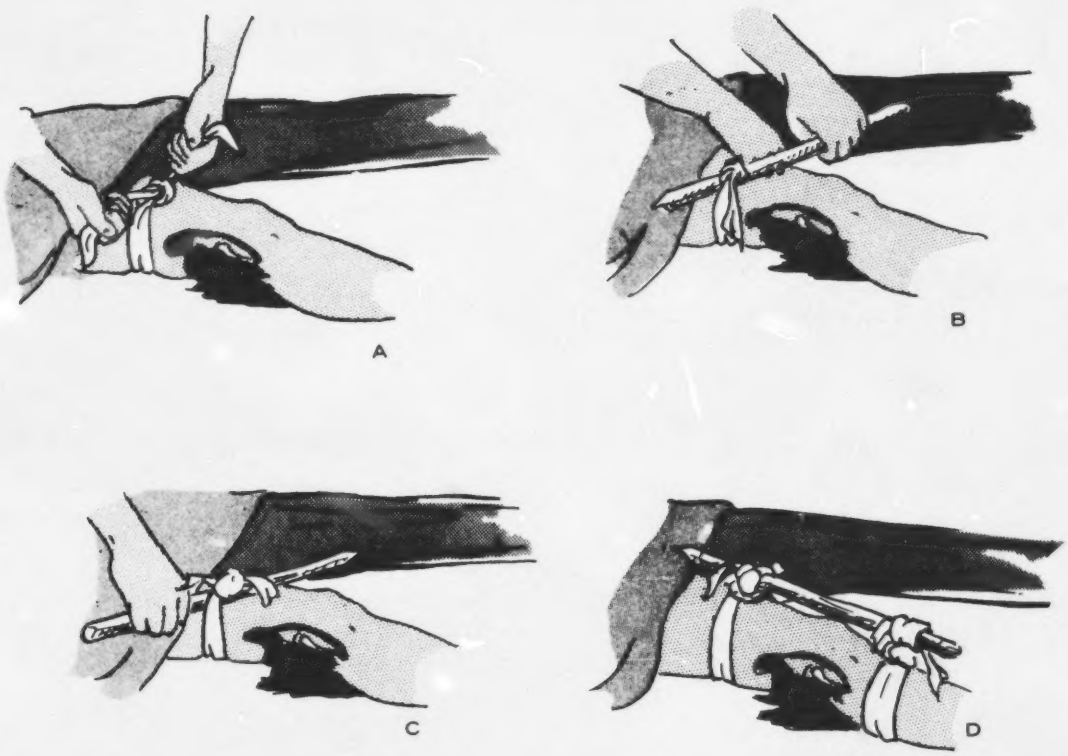


Figure 3. Application of improvised tourniquet. A—Wrap cravat bandage twice around the extremity and tie an overhand knot; B—Put stick over first knot; C—Tie second knot, and twist stick to tighten tourniquet; D—Secure stick in position by tying another strip of material about extremity. To discourage the use of the tourniquet it is recommended that only improvised material be used. This will prevent the misuse and possible overuse of accessible commercially made devices.

SIGNS AND SYMPTOMS

Internal bleeding should always be suspected in victims that exhibit severe shock; weak, rapid pulse; low systolic B/P, with no obvious injuries. The victim may be conscious or unconscious.

EMERGENCY CARE

Internal bleeding can only be controlled by surgery. Cold applications to the suspected area may have some effect in retarding the flow of blood, but extreme cold for long periods should be avoided. Lay the victim down and treat for shock. Transportation to a medical facility is imperative, but caution must be exercised to prevent aggravation of the victim's condition.

WOUNDS AND BANDAGING

OBJECTIVES

Upon completion of the following chapter, you will be able to:
—describe various types of wounds.
—decribe emergency care for various wounds.
—decribe various bandaging materials and their application methods.

Following instruction and/or practice, you will be able to:
—demonstrate emergency treatment for various wounds.
—demonstrate various bandage applications.

INTRODUCTION

Wounds account for the majority of trauma seen by the EMT. Most people will sustain a wound of some nature during their lifetime. There are five types of wounds encountered. The EMT should be able to recognize each type of wound and administer the proper emergency care.

WOUNDS

DEFINITION

A wound is any injury in which there is a break in the skin or in the lining of the body's cavity.

All open wounds present two major problems, infection and bleeding. Infection must be considered a possibility no matter how small the injury may appear. Excessive bleeding can be dangerous and must be controlled as soon as possible.

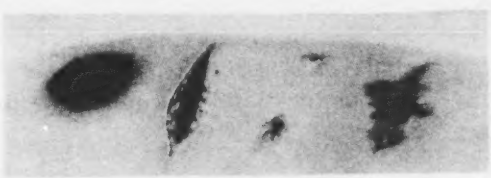


Figure 1. Kinds of wounds. From left to right: abrasion, incised, punctured, lacerated.

TYPES OF WOUNDS

Open wounds are classified according to the following types: abrasions, incised, lacerated, and punctured. See Figure 1.

Abrasions—These wounds are caused by a scraping of the skin, sometimes referred to as "brush-burns" or "friction-burns." There usually is little bleeding and the abrasion frequently contains particles of foreign matter such as cinders, grease, or dirt. Since large areas of the skin are scraped off, the wound may be painful.

Emergency Care—The entire area must be covered with a sterile dressing. This can be held in place with adhesive tape or, if the area is large, secure the dressing with a snug bandage.

Incised Wounds—Incised wounds are caused by any sharp cutting object, such as a knife, razor, glass, or sharp metal. The blood vessels and tissue are severed with what is usually referred to as a "clean cut," leaving a smooth-edged, free-bleeding wound that may produce sharp stinging pain. The chief dangers are severe bleeding and damage to nerves and tendons.

Emergency Care—The wound edges may be drawn together and secured with "butterfly strips." These can be made from tape, improvised from small Band-Aids, or purchased commercially. Apply a sterile pressure dressing and treat for shock.

Lacerated Wounds—Lacerated wounds are jagged with irregular edges and are caused by blunt instruments, stones, machinery, or direct blows. These wounds can bleed very little or very heavily and vary in depth and shape. Parts of skin and tissue may be partly or completely torn away. Lacerations contain much foreign matter such as street dirt, grease, bits of clothing, glass, etc. In accidents caused by machinery, body parts may be crushed and bleed freely. All severe wounds of this type will produce shock and, in extreme cases, prove fatal. (Although there is a technical difference between incised wounds and lacerations, many people in the medical community refer to incised wounds as lacerations.)

Emergency Care—Control the bleeding and protect the wound by covering with a thick, sterile pressure dressing. In cases of severe injuries, immobilization of the part may be necessary. Treat for shock and transport to a medical facility.

Puncture Wounds—A puncture wound is a perforation of the skin and tissues caused by nails, stabs, gunshots, or any sharp object capable of penetrating the skin. Although the opening in the skin may be small, this type of wound is very deep and proves to be serious. Contaminating foreign matter is often carried into the wound. The penetrating object may break, leaving a piece in the tissues; parts of clothing may be pushed into the wound. The dangers of this type of wound are injury to internal organs and infection.

A gunshot wound may cause deep internal bleeding with damage to vital organs. The points of entry and exit of a bullet must receive equal attention. If the bullet has entered the chest and abdomen, the care will be as indicated for chest and abdominal injuries.

Emergency Care—Penetrating objects must not be removed, but should be immobilized and supported. Cover the wound with a sterile dressing, treat for shock, and transport to a medical facility. Tetanus immunization for this victim must be checked by the attending physician.

AVULSIONS (SEVERED BODY PARTS)

Whenever a portion of the body is completely severed or torn away (usually extremities, but may also be an ear, etc.), immediate bleeding control must be applied and the injury site protected with a proper pressure dressing. Treat for shock and remember that the severed part must accompany the victim to the medical facility. The avulsed part should be kept dry, placed in a dry/sterile plastic bag, sealed, and kept cool (do not freeze).

DRESSINGS AND BANDAGES

Dressings should not be confused with bandages since a bandage represents the outside covering of a dressing. A dressing is a sterile covering applied to a wound or injured part to:

1. Assist in the control of bleeding.
2. Protect a wound from further injury.
3. Prevent the introducton of bacteria.

Dressings are fixed in position over a wound either with a bandage or tape.

Dressings range in size from the 2″ × 2″ - 3″ × 3″ - 4″ × 4″ gauze pads to the 10″ × 30″ universal dressing. Bandage compresses that have a dressing sewn to a length of bandage, ranging in sizes of 1″ × 1″ to 4″ × 4″ and packaged in individal, sterile units, are used quite frequently.

Bandages are used to hold dressings in place, secure splints, create pressure, and immobilize and support body parts. The most frequently used bandages are roller bandages, triangular bandages, four-tailed bandages, and many-tailed (scultetus binder) bandages.

The roller bandage has improved over the years to the recent development of the "soft, self-adhering" bandage that is popular with most emergency medical personnel and is highly recommended for all emergency medical services.

Bandages should be applied tightly enough to control bleeding and prevent the dressing from moving, but not so tightly as to interfere with circulation. Therefore, **elastic bandages are not recommended.** To eliminate the possible danger of injurious pressure if improperly applied, elastic bandages should be replaced with the soft, roller-type bandages.

The EMT should be familiar with the general application of the various types of bandages. The comfort of the victim and the security of the dressing depend upon the proper application of a bandage. An untidy, uncomfortable, insecure bandage can only result in adverse criticism and, for this reason, it is highly recommended that EMTs use only the "soft, self-adhering" bandage which is much easier to apply.

TRIANGULAR BANDAGE FOR THE HEAD

When using the triangular bandage to retain dressings on forehead or scalp, the following procedure should be followed.

Fold back the base of the bandage about two inches, making a hem. Place the middle of the base (hem outside) on the forehead just above the eyebrows. Let the point fall over the head and down the back of the head. Bring the ends of the triangle around the back of the head above the ears, cross them over at the back and carry them around to the forehead, tying them in a square knot. Holding the dressing with one hand, gently but firmly pull down on the point with the other hand until the dressing is snug; then bring the point up and tuck it over and in the bandage where it crosses at the back of the head. See Figure 2.

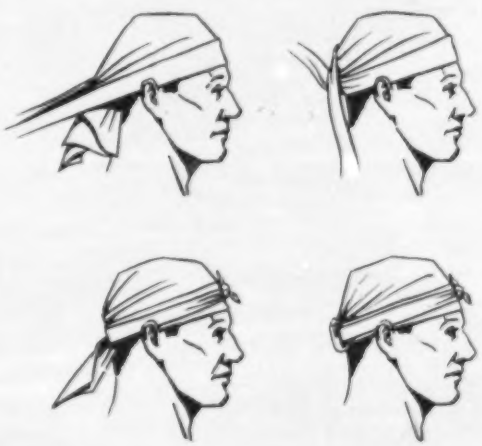


Figure 2. Triangular bandage for head

TRIANGULAR BANDAGE FOR THE SHOULDER

When using the triangular bandage to hold a dressing on the upper arm or shoulder, two triangular bandages are necessary.

Fold the first triangular bandage into a narrow cravat (see Figure 3). Place the base of the cravat on top of the shoulder on injured side and bring ends across back and chest. Continue bringing cravat under opposite armpit around in front. Before tying a knot, place a pad in the armpit on the uninjured side to prevent pressure by the narrow cravat. Then tie a square knot. Turn up the base and make a hem of the second triangular bandage and apply it to the arm on the injured side. Carry the ends around

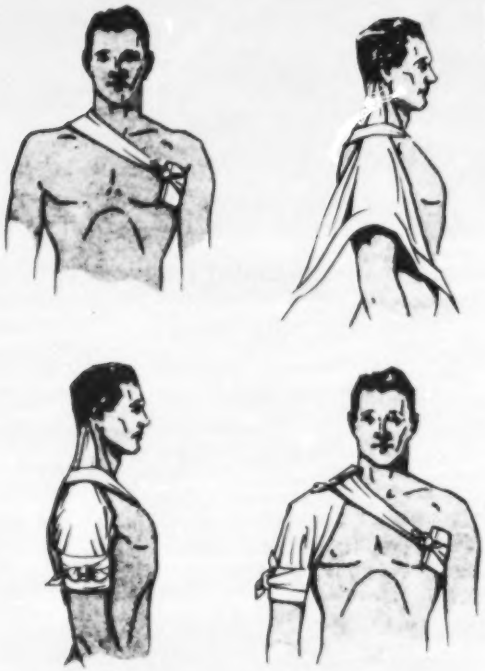


Figure 3. Triangular bandage for shoulder

behind the arm; cross and tie them in front but not too tightly. Check circulation frequently to be sure a tourniquet effect has not been inadvertently created. Support the dressings firmly with one hand, and with the other tuck the point of this triangle under and over the cravat on the shoulder until the dressings are held snugly in place. Pin the point to secure it, or bring the point of the bandage under and around the cravat several times to secure it.

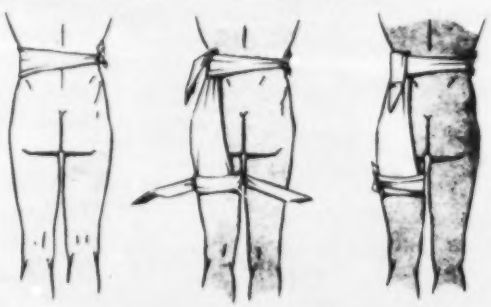


Figure 4. Triangular bandage for hip

TRIANGULAR BANDAGE FOR THE HIP

The triangular bandage may also be used to retain dressings on buttock or hip.

This requires two triangular bandages. Take the first and make into a narrow cravat; tie it aound the waist with the knot on the uninjured side. Take the second triangular bandage and tuck the point under and over the cravat, letting the base hang down over the thigh on the injured side. Make a hem along its base to the height desired, carry the ends around the thigh, cross, bring around to outside, and tie. With the left hand, hold the dressing in place and gently pull the point hooked through the waist cravat until the dressing is well supported. To secure the point, use a safety pin or tuck under. See Figure 4.

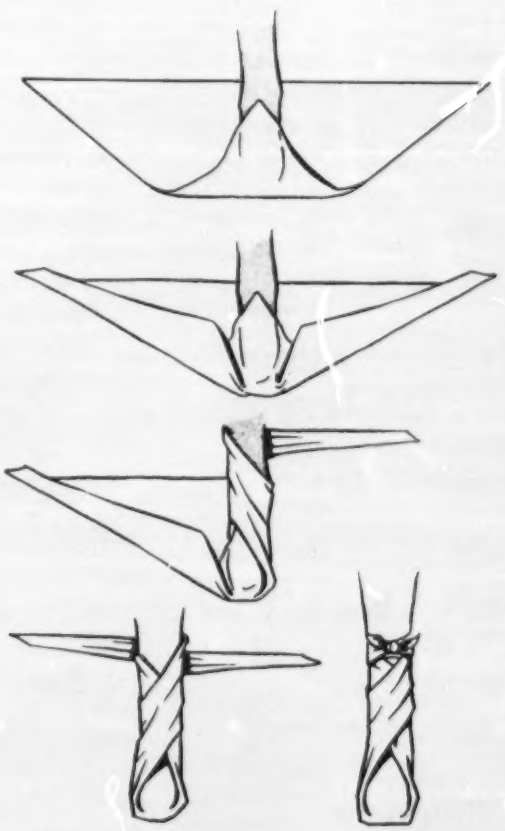


Figure 5. Triangular bandage for foot or hand

TRIANGULAR BANDAGE FOR THE FOOT OR HAND

This bandage is designed to retain large dressings of the hand or foot.

Place the foot or hand in the center of a triangular bandage and carry the point over the ends of the toes or fingers and on up to the upper part of the ankle or wrist. Fold in excess bandage at the sides, cross the ends in front, continue around back, cross, bring around to front, and tie in a square knot. See Figure 5.

THE CRAVAT BANDAGE

To make a cravat bandage, bring the point of a triangular bandage to the middle of the base and continue folding until the desired width is obtained. See Figure 6.

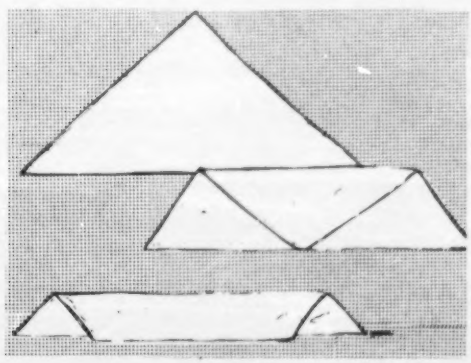


Figure 6. Making a cravat bandage

CRAVAT BANDAGE FOR THE HEAD

This bandage is very useful to control bleeding from wounds of the scalp or forehead. It is placed over the dressing as follows.

Place the center of the cravat over the dressing, bring the ends around to the opposite side, cross them, and continue around to the front. Tie with a square knot. See Figure 7.

Figure 7. Cravat bandage for head

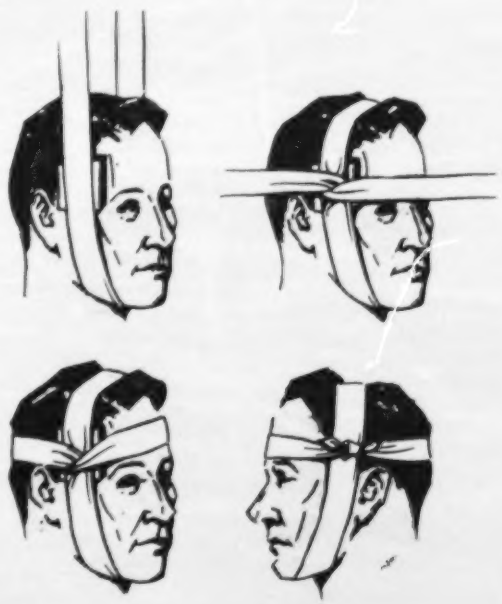


Figure 8. Cravat bandage for temple, cheek or ear

CRAVAT BANDAGE FOR THE TEMPLE, CHEEK, OR EAR

Place the center of the cravat over the dressing and carry one end over the top of the head and the other under the jaw and up the opposite side, crossing at right angles over the temple on the injured side. Continue one end around, over the forehead, and the other around the back of the head to meet over the temple on the uninjured side. Tie with a square knot. See Figure 8.

CRAVAT BANDAGE FOR THE ELBOW OR KNEE

When applying a bandage to the elbow or knee, the joint should be flexed in order to allow a certain amount of movement. Bend the knee or elbow at the angle shown in Figures 9 and 10. Place the middle of a rather wide cravat over the point of the joint, carrying one end around the upper part of the elbow or knee, bringing it back to the hollow, and the other end entirely around the lower part, bringing it back to the hollow. See that the bandage is smooth and snug; tie with a knot outside the hollow.

Figure 9. Cravat bandage for knee

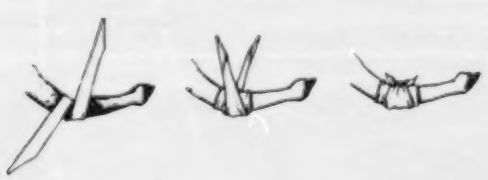


Figure 10. Cravat bandage for elbow

CRAVAT BANDAGE FOR THE ARM, FOREARM, LEG, OR THIGH

The width of the cravat depends upon the extent of injury and size of the dressing covering it. For a small area, place the cravat bandage over the center of the dressing. Bring the ends around in back, cross them, bring back around to the dressing, and tie over it. For a small extremity, it may be necessary to make several turns before tying. If the wound covers a larger area, hold one end of the bandage above the dressing and wind the other end spirally downward across the dressing until it is secure, then upward across the dressing until it is secure, then upward and around again, and tie a knot where both ends meet. See Figure 11.

Figure 11. Cravat bandage for arm, forearm, leg or thigh

CRAVAT BANDAGE FOR THE ARMPIT

Place the center of the bandage in the armpit over the dressing, carry the ends up over the top of the shoulder and cross them. Continue slantwise across the back with one end and across the chest with the other, over the opposite armpit, and tie them where they meet over the chest. Do not draw the bandage too tightly or the artery may be compressed, adversely affecting circulation to the arm. See Figure 12.

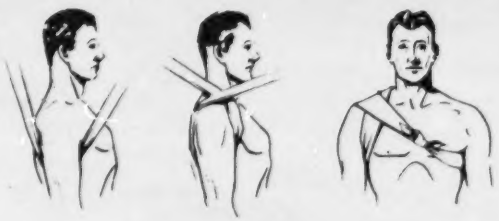


Figure 12. Cravat bandage for armpit

SUMMARY

All dressings should be sterile, handled by the edges only, and thick enough to control the bleeding and protect the wound.

Bandages used, regardless of the type, must be snug enough to hold the dressing in place and assist in the control of bleeding; and yet not too tight to interfere with circulation.

As mentioned earlier the "soft, self-adhering" bandage is highly recommended.

With practice an EMT can apply nearly every type of bandage described in this chapter with the self-adhering bandage and do a neater and better job with it just by using circular turns. The EMT, however, should not forget the other types of bandages. The time may come when a triangular, cravat or old roller bandage is the only type of bandage available. The EMT should be able to use all types of bandages and dressings in the event there are multiple victims and the normal supply of self-adhering bandages is depleted.

Any severed body parts should accompany the victim to the hospital. A severed part must be kept out of sight of the victim, kept dry, placed in a dry/sterile plastic bag, sealed, and kept cool (do not freeze).

SHOCK

OBJECTIVES

Upon completion of the following chapter, you will be able to:
—recognize the importance of early emergency care for the shock victim.
—describe the causes and symptoms of shock.
—describe treatment for a shock victim.

Following instruction and/or practice, you will be able to:
—demonstrate emergency treatment for the shock victim.

INTRODUCTION

Shock is a serious condition frequently occurring in victims of injury or serious illness and should be given prompt attention. Only the control of breathing and bleeding has priority over the treatment of shock. The EMT should follow the procedures as outlined in this textbook to alleviate the progression of shock. The EMT will not have the capability to actually treat severe shock at the scene or during transport, until properly trained to give intravenous fluids.

DEFINITION

Shock is a state of collapse or depression that interferes with the normal action of the heart, respiration, and circulation. It can be referred to as a chain reaction of inadequate oxygenation of body tissue and organs. This reaction leads to decreased cardiac output and decreased blood pressure, thus a further reduction of tissue oxygenation. This reaction continues until irreversible damage has occurred and, for this reason, prompt attention must be given to victims of SHOCK. This condition will occur in one degree or another as a result of injury, illness, or a sudden mental disarrangement.

TYPES OF SHOCK

Shock can be classified as to type, namely hypovolemic (blood loss, wounds, burns, etc.), neurogenic (nervous system disarrangement), cardiogenic (impaired circulation and breathing), anaphylactic (stings from bees, wasps, drug sensitivity), septic (bacterial infections), and metabolic (severe disturbance of body salts or acid-base balance). More than one type of shock may be present to varying degrees in the same victim. Generally the word shock refers to hypovolemic shock, the most frequent type of shock encountered by the EMT.

HYPOVOLEMIC SHOCK

This condition is also known as secondary, delayed, surgical, traumatic, or wound shock. Burn shock and bleeding shock are varieties. The outstanding characteristic is a decrease in the volume of circulating blood that may be caused by:

1. Direct loss of blood as in external or internal bleeding.

2. Loss of plasma of the blood by seepage into tissues at the site of burns, contusions, and crush injuries.

3. Loss of fluids from the intestinal tract in severe vomiting, diarrhea, or other intestinal disorders. This loss dehydrates the body and decreases the circulating blood volume as well.

As an example, it has been estimated that in a fracture of the femur there is a loss of approximately two pints from the volume of circulating blood. A part of this loss is from bleeding into surrounding tissues and a part is from seepage and loss of plasma and other fluids into the damaged soft tissues around the fracture.

In shock, the reduced blood volume causes a decrease in the heart output and reduces the overall circulation. This results in a lowered amount of oxygen being delivered to the body tissue and a lowered transport of waste products away from the tissue cells. The tissue cells in turn react by producing an abnormal amount of waste products, which can cause a severe chemical reaction.

Early recognition and treatment of shock result in a great degree of success. But if treatment is delayed and tissue destruction progresses, it then becomes more difficult to obtain recovery in spite of intensive treatment. Whenever the blood pressure drops below a certain level, the kidneys become unable to produce urine. If low blood pressure of this degree (60 to 80 systolic) exists for longer than a brief period, kidney shutdown may continue even after the blood pressure is returned to normal levels. This is a serious complication that may result in death.

Prolonged shock can also cause serious effects on the brain, heart muscle, and liver. Complete knowledge of the cause and complications of shock will enable the EMT to understand the importance of early, effective emergency care.

SIGNS AND SYMPTOMS

Shock should be expected in all victims who have severe bleeding, abdominal or chest injuries of any type, crush injuries, all major fractures—both closed and open—amputations, burns, or any severe wound or injury found anywhere in the body. The symptoms of shock will vary, and the following do not appear in every victim. An evaluation of the extent and severity of the combined injuries is more important than any one particular sign or symptom. It is most important to suspect and care for shock before the distinct symptoms develop. **The following represents the wide variety of signs and symptoms that may be presented by the victim in shock.**

1. Eyes may be glassy, lackluster, have dilated pupils, or suggest fear and apprehension.

2. Breathing may be rapid or labored. In advanced stages, the breathing becomes shallow and irregular.

3. The lips may be pale or have a bluish-gray color (cyanotic).

4. The skin may be pale or ashen gray; in the dark-complexioned the mucous membranes help to identify shock.

5. Skin temperature may be lowered and the body covered with a clammy sweat.

6. The pulse may be rapid, weak, thready, and of poor volume. In victims who have lost a considerable amount of blood, it may be difficult to find a pulse.

7. There may be retching, nausea, vomiting, and dryness of mouth, lips, and tongue.

8. The victim may frequently complain of thirst. Shock victims may complain of thirst rather than pain, even though severely wounded.

9. Restlessness and apprehension are usual symptoms.

10. Victim may be partly or totally unconscious.

11. There may be a marked drop in blood pressure (systolic pressure below 90).

EMERGENCY CARE

In hypovolemic shock, the most important requirement is to stop and reverse the progression by restoring the circulatory blood volume. Only when circulatory volume has been restored can improvement and recovery from shock be expected. All emergency medical personnel must be trained to take blood pressure and eventually give intravenous fluids. **How-**

ever, the following general measures should be applied to all victims in shock regardless of intravenous fluids.

1. Treat the cause. Control all bleeding, and bandage all wounds. Splint all fractures to avoid further damage and aggravation.

2. Reassure the victim.

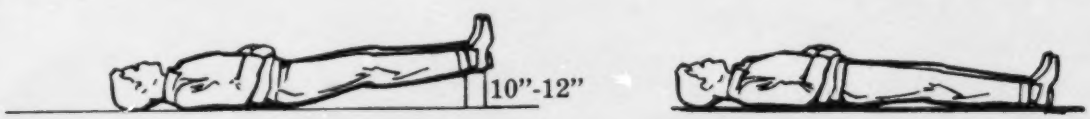
3. Support with oxygen.

4. Conserve body heat. Make sure the victim is covered both **over** and **under** the body. Remove wet clothing to eliminate rapid cooling from evaporation. **Always consider the temperature of the environment** so as not to induce sweating. Artificial means of heating (hot water bottles, hot brick, etc.) are not indicated because it causes dilation of the surface blood vessels that further deplete overall circulation.

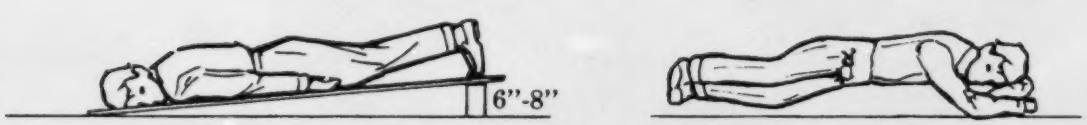
5. Position (see Figure 1). Much can be said about the positions for a victim in shock. It can be very important and it can also vary, depending on the injuries of the victim. **The ideal position for a victim in shock is the supine position (flat on back) with the legs elevated 10 to 12 inches.** The EMT must be careful not to slant the entire body. When the entire body is put on a slant, the abdominal organs and contents press against the diaphragm causing breathing to be more difficult.

If elevating the victim's legs causes increased pain or discomfort to the victim, leave the victim flat.

If face, jaw, mouth or throat injuries produce bleeding into the upper air passage, the victim should be placed in a prone position (on stomach) with head turned to one side and the foot



Shock Positions



Aspiration Positions

Positions to Ease Respiration

Figure 1. Victim Positions

of the stretcher raised six to eight inches to prevent aspiration of blood and other matter into the lungs. If injuries do not permit this position, place victim on side (left side if possible). This also will help prevent aspiration. This is the ideal position for the victim that is vomiting.

If there is head or chest injury, the victim should have the head and shoulders slightly elevated. If the victim is having difficulty in breathing, place victim in a semi-sitting position.

Above all, use good, common sense.

6. Fluids. No fluids are to be given by mouth to the unconscious victim or to the victim that will undergo immediate surgery. The shock victim may repeatedly complain of thirst. This can be alleviated somewhat by moistening the lips with a wet cloth and offering continued reassurances.

7. Anti-Shock Trousers. This device is used for the rapid control and/or temporary reversal of shock; sometimes they are referred to as MAST—Medical Anti-Shock Trousers. (See Figures 2 and 3.) This device is now available and can be used with great success by the EMT. A real danger exists in the use of this garment where personnel in the emergency department do not recognize the need for volume replacement prior to removal of the trousers.

The emergency medical service should be certain the emergency department of the receiving hospital understands the principles of this equipment. (Note: Before using, permission to use this device should be obtained from your medical advisor.)

Anti-shock trousers apply a basic principle to meet emergency situations that involve certain bleeding conditions and low circulatory blood volume.

The principle is the application of pressure by use of a foot pump. This pressure is encircled around both legs and the abdomen, effectively slowing or stopping arterial bleeding and forcing any available blood from the lower body to the heart, brain, and other vital organs in the upper body; and preventing the return of the available circulating blood volume to the lower extremities. By preventing return of the blood to the lower portion of the body, the anti-shock trousers convert an inadequate circulating blood volume for the total body to a possibly adequate circulating blood volume for the upper half of the body; thus reducing the possibility of irreversible damage caused by severe shock.

To achieve maximum results, the anti-shock trousers should be applied as soon as possible. The inflated trousers will help control the movement of fractures of the pelvis, hip and lower extremities.

If there is bleeding from a wound on the body that can be controlled by a simple pressure dressing or other means, the trousers may be used in the normal manner. However, if the source of bleeding is above the area of the body which would be enclosed by the trousers, and the bleeding cannot be controlled by pressure dressings, the trousers should not be used.

WARNING: If chest, spinal cord, or head injuries are suspected, the anti-shock trousers may be harmful. If pain increases after inflation of trousers, decrease pressure in that area as necessary. Note: Before using anti-shock trousers in these situations, check with your medical advisory board.

Anti-shock trousers **should not** be deflated or removed until:

1. A physician is present and has taken charge of the patient and has knowledge of the principles of the trousers.

2. Fluids are available for intravenous infusion.

3. Anesthesia and surgical teams are ready for the patient.

X-rays and electrocardiograms can be taken and urinary catheters can be used without the removal of the trousers.

There are different types of anti-shock trousers: single-chambered, double-chambered and the latest, the three-chambered, with each leg and abdomen being a separate chamber that can be independently deflated if necessary. This model (with the three independent chambers) is the most desirable. Pediatric models are also available.

The victim is placed on the trousers and the segments are wrapped and fastened with Velcro fasteners or zippers. In use, it totally encloses all the body from the lower rib cage margin to, but not including, the feet. Each lower extremity is separately enclosed. The trousers are then inflated by the foot pump until the Velcro fasteners begin to crackle or the pressure relief valve is activated, the pressure gauge reaches the desired pressure, or the victim's signs stabilize or improve. The air valves are then closed and the air pump removed. The victim's lower body and extremities are now relatively immobile. With practice, the anti-shock trousers can be placed and inflated within 60 seconds.

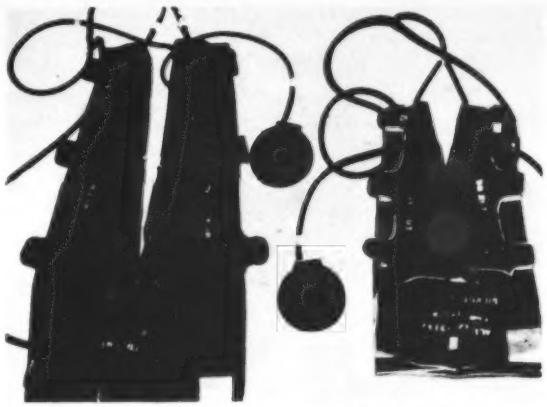


Figure 2. Anti-shock trousers, adult and pediatric. Models shown have three independent chambers.

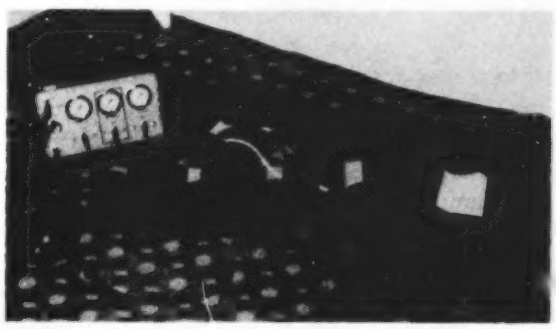


Figure 3. Gage model anti-shock trousers.

NEUROGENIC SHOCK

Neurogenic shock is a result of the disarrangement of the autonomic nervous system. It is seen in cases of head and spinal cord injuries. This disarrangement brings about a widespread dilation of the blood vessels and capillaries, causing the blood to leave the active circulation and pool primarily within the organs of the abdominal cavity. This reduces the volume of blood in actual circulation and causes a drop in output of blood by the heart.

SIGNS AND SYMPTOMS

The neurogenic shock victim may present signs and symptoms usually associated with head and spinal cord injuries. Low blood pressure with a slow heart rate is an indication that the victim may be suffering from neurogenic shock.

EMERGENCY CARE

Treat for head and/or spinal cord injuries. If the victim is suffering from neurogenic shock, keep the victim supine, administer oxygen and transport to a medical facility.

CARDIOGENIC SHOCK

Cardiogenic shock is caused by the inadequate functioning of the heart. Proper blood circulation depends on efficient and continuous heart aspiration. The heart muscle can be weakened by certain diseases and disorders which significantly reduce its output. The heart is thus unable to move the blood to the body and circulation is impaired.

SIGNS AND SYMPTOMS

The signs and symptoms of hypovolemic shock will be present in one degree or another.

EMERGENCY CARE

The patient in shock as a result of a heart attack specifically does **not** require a transfusion of blood or fluid or elevation of the legs. In this patient, shock is a result of the inability of the heart to handle the blood volume the patient already has. This patient is often able to breathe better in a sitting position and may tell the EMT so. The patient should be permitted to sit up if so desired.

Usually these patients do not have injuries but have had, and may still be having, chest pain. The pulse is commonly irregular and may be weak. The blood pressure is low. Cyanosis is frequently present about the lips and under the fingernails. They may very well be anxious. Occasionally patients who have had heart attacks vomit.

These patients should be treated by placing them in the position in which they can breathe most easily, administering oxygen, assisting ventilation when necessary, and transporting them to the emergency department. Reassurance and a calm attitude are required in treating them.

ANAPHYLACTIC SHOCK

Unlike other types, anaphylactic shock is not the result of injury or illness. It is the result of an individual's being overly sensitive to insect bites, such as bee and wasp stings, drugs and other medications, or from certain foods.

SIGNS AND SYMPTOMS

A history of the victim's medical condition and recent activities may be the best indication as to the cause and possible care of anaphylactic shock. In severe cases, the following symptoms may be exhibited.

1. Respiratory distress and difficult breathing due to swelling of the vocal cords.

2. Mottled, livid and blue appearance of the skin.

3. Severe headache.

4. Rapid loss of consciousness.

Even if the above symptoms are not present, the victim will appear to be in deep shock with swelling of the abdomen, nausea, vomiting, and diarrhea.

EMERGENCY CARE

Anaphylactic shock must be considered an emergency situation, and prior notification to the hospital is warranted.

1. Maintain an open airway and support with oxygen.

2. In cases of low blood pressure, application of the shock trousers may be indicated.

3. Place the victim in a semi-reclining position to ease respiration.

4. For insect bites, place a constricting band between the sting and the heart (pulse should still be felt below the constricting band), and remove the stinger.

5. Provide prompt, careful transportation to a hospital, for only there can this condition be properly treated.

SEPTIC SHOCK

This condition occurs when severe infections release toxins (poisons) into the bloodstream. The blood vessels will dilate and lose plasma through the walls of the vessels, thus causing a reduction in blood volume.

This type of shock is normally seen with serious illness or surgery and long hospitalization. The EMT will rarely see this shock condition.

SIGNS AND SYMPTOMS

The signs of septic shock will vary and will normally represent the wide variety of signs and symptoms listed under hypovolemic shock.

EMERGENCY CARE

The proper care of septic shock requires immediate hospitalization. If septic shock is suspected, administer oxygen and all emergency

treatment for shock including the use of MAST trousers, if indicated, and transport to hospital immediately. Oxygen and intravenous fluids (if your emergency medical service is permitted to administer) may be needed en route to the hospital.

METABOLIC SHOCK

Metabolic shock is brought on by fluid loss from diarrhea, urination, or vomiting or because of a severe disturbance of the acid-base balance or body salts. This is often caused by a disease, normally in its late stages.

SIGNS AND SYMPTOMS

The symptoms of metabolic shock will be the same as septic shock and, as most shock cases, represent a wide variety of signs and symptoms.

EMERGENCY CARE

The proper care for metabolic shock (same as septic shock) requires immediate hospitalization. If metabolic shock is suspected, give all emergency treatment for shock and transport to hospital immediately. Oxygen and intravenous fluids (if your EMS is permitted to administer) may be needed en route to the hospital.

SUMMARY

Shock, except in cases of cardiogenic shock, is basically a deficiency of circulating blood. This deficiency is caused by loss of blood volume. The loss may be outside the body due to hemorrhaging, burns, etc., or internal hemorrhaging; or it could be intravascular blood volume loss. This means blood forms pools in one part of the vascular system and therefore is unavailable to the remainder of the vascular system. Thus, the body as a whole is deprived of oxygen-enriched blood.

The three main symptoms of severe shock are:

1. Pale, cool, clammy skin
2. Rapid, weak pulse
3. Drop in B/P

Basic treatment of shock includes:

1. **Treating** the cause. Many times this in itself will prevent or keep shock from becoming serious.

2. **Positioning** the victim. A horizontal position with feet and legs elevated 10 to 12 inches is ideal. However, you must consider the injuries.

3. **Conserving** body heat. Always consider the environment. In extreme cold, blankets under the victim can be as important as those over the victim.

4. **Supporting** victim with oxygen.

5. **Reassuring** the victim.

6. **Not giving fluids by mouth.** Only moisten the victim's lips using a wet cloth.

7. **Administering** intravenous fluids if your EMS is permitted.

Remember, shock is a serious condition and must be given prompt attention.

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